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REVISION OF THE GENUS *KUMBA*  
(PISCES, GADIFORMES, MACROURIDAE),  
WITH THE DESCRIPTION OF THREE NEW SPECIES

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**ABSTRACT:** The genus *Kumba* Marshall, 1973 is revised to include nine species: *K. calvifrons* n. sp. from the mid-Atlantic Ridge; *K. dentoni* Marshall, 1973; *K. gymnorhynchus* n. sp. from the eastern Indian Ocean; *K. hebetata* (Gilbert, 1905); *K. japonica* (Matsubara, 1943); *K. maculisquama* (Trunov, 1981); *K. punctulata* n. sp. from the Bismark and Coral seas; and two other species, here described but not named because of the immature state or questionable status of available specimens. *Parakumba* Trunov, 1981 is synonymized with *Kumba*. The characters in combination uniting the genus include the extensive naked areas on the dorsal and ventral snout surfaces and the underside of the head; the absence of snout scutes; a distinctive squamation on the head characterized by small scales with one to few comblike, ridge-rows of small, erect spinules; and no coarse scutelike scales on suborbital shelf.

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INTRODUCTION

During examination of the Soviet deep-sea fish collections in the P. P. Shirshov Institute of Oceanology (IOAN) and the Zoological Museum of Moscow State University (ZMMGU) in 1988, we found three specimens of two undescribed species of macrourids that appeared to belong to the genus *Nezumia* Jordan, 1904. The extensive naked areas on the head and a distinctive squamation in these specimens suggested, however, that they represented a different genus. These findings spurred a subsequent reexamination of a juvenile macrourid (CAS 77314) from the Gulf

of Mexico and another (ZMMGU P.17762) from off New Guinea, which also shared these peculiar characteristics. A mature female from New Caledonia, received after completion of the first draft of this paper, represented the adult stage of the species from New Guinea. A search of the literature disclosed six other species that shared these characters of naked head areas and squamation: *Nezumia hebetata*, *N. japonica*, *N. liolepis* (Gilbert, 1890), *Parakumba maculisquama*, *Asthenomacrus victoris* Sazonov and Shcherbachev, 1982, and *Macrosmia phalacra* Merrett, Sazonov, and Shcherbachev, 1983.

Although the original description of *Kumba*

*dentoni* did not indicate whether the snout was scaled or not, Nigel Merrett of the BMNH (in litt. to YIS, 23 Feb. 1981, and to TI, 14 Jan. 1992) informed us that the holotype, and only known representative of that genus, has extensive naked areas distributed much as in *P. maculisquama* and other related species. The spinulation on scales of this species are reduced but suggestive of others in this group. The monotypic genus *Haplomacrouirus* Trunov, 1980 is characterized by a completely naked snout, but it is very different in many other ways from all other genera.

Placement of the new species into a known genus has proved troublesome, especially with the presence of at least five different genera to which one or more of these distinctive characters have been attributed. *Nezumia* Jordan, 1904 is excluded because the other species of the genus (excluding those here considered) lack the full complement of these characters. *Asthenomacrus* and *Macrosmia* are excluded because they lack a well-developed light organ, and the anus is situated immediately before the anal fin, far from the forwardly placed pelvic fins. This leaves only *Kumba* and *Parakumba* as possible genera in which to place our new species, but the species lack the inflated head common to those two genera and they have a weakly to strongly serrated spinous dorsal ray, as opposed to weak or obsolete serrations. We contemplated erection of a new genus for the species but it was deemed premature in the absence of a more comprehensive analysis of relationships within the tribe. For reasons discussed below, we include *Parakumba* in the synonymy of *Kumba* and treat our new species in an expanded concept of that genus.

The purposes of this paper are to revise the genus *Kumba*, discuss its possible relationships to other related genera, describe the three new species, and record other unidentifiable representatives of the genus.

#### METHODS

Methods for making counts and measurements and the use of abbreviations follow Iwamoto (1970) and Iwamoto and Sazonov (1988). Institutional abbreviations follow Leviton et al. (1985) and Leviton and Gibbs (1988). References for species names are given in the LITER-

ATURE CITED section. The reader is referred to Eschmeyer (1990) for complete references to generic names.

#### RELATIONSHIPS OF *KUMBA*

The genus *Kumba* was erected to include a single species, *P. dentoni*, known only from the holotype taken in the northeastern Atlantic in the Bay of Biscay. Marshall (1973:616) considered the genus most closely related to *Paracetonus* Marshall, 1973, differing only in the latter having a serrated dorsal spine, fewer pelvic rays (5–7), and different location of anus (just before origin of anal fin).

In describing *Parakumba*, Trunov (1981) considered that its relationships lie with the group that includes *Cetonurus* Günther, 1887, *Paracetonus*, and *Kumba*, with *Kumba* being the most similar. Among the diagnostic characters of the genus, Trunov included the comparatively large head lacking ridges of modified scales, the extensive naked areas on the head, and the small scales having divergent crestlike rows of small, conical spinules.

In two papers, Sazonov and Shcherbachev (1982, 1985) provided their preliminary views of relationships among the *Cetonurus* group of macrourine grenadiers. They considered *Kumba*, *Parakumba*, *Macrosmia* Merrett, Sazonov, and Shcherbachev, 1983, and *Asthenomacrus* Sazonov and Shcherbachev, 1982, as constituting "a natural group with *Nezumia hebetata*" (Sazonov and Shcherbachev 1985:24), based on the following features: (1) no scales on anterodorsal and ventral parts of snout; (2) scale spinules in crestlike rows; (3) no modified terminal snout scales; (4) suborbital without ridges of modified scales; and (5) pores of cephalic-sensory system present. The two authors hypothesized that the group arose from an ancestor close to *Nezumia ventralis* Hubbs and Iwamoto, in Iwamoto 1979, and *N. japonica* (Matsubara, 1943).

Although these five characters might seem to be synapomorphies defining a monophyletic group, all are found to various degrees in other related (sometimes remotely related) macrourid taxa. For example, a partially naked snout is found in numerous species of *Nezumia*, *Mataeocephalus* Berg, 1898, *Sphagemacrus* Fowler, 1925, *Caelorinchus* Giorna, 1809, *Coryphae-*

*noides* Gunnerus, 1765, and others, although not in combination with the absence of snout scutes. It seems that loss of scales, particularly on the underside of the snout, is a common occurrence among grenadiers. The almost completely naked snout of *P. maculisquama* and others here considered appears to be a reduction carried to the penultimate stage. The second character, scale spinules in crestlike rows, is much like that found in *Mesobius* Hubbs and Iwamoto, 1977 and some species of *Caelorinchus*. Characters 4 and 5 are also widely and randomly distributed among different genera.

We consider the relative positions of the pelvic fins, anal fin, and the anus, and the relative development of the light organ in *Asthenomacrus* and *Macrosmia* to be of phylogenetic importance and evidence for a distant relationship of *Kumba*, *Parakumba*, and *Nezumia*. In the first two genera only the pelvic fins are in a forward position, with the anus far removed and immediately before the anal fin, and the light organ is apparently absent. In contrast, in *Nezumia*, *Kumba*, and *Parakumba*, the pelvic and anal fins are both anteriorly placed, with the anus in between the pelvic and anal fins; the light organ is well-developed with a light gland (referring to the pouch-like structure housing the luminescent bacteria), a distinct lens-like body, and an anterior dermal window (condition of these in *K. dentoni* not known).

Previous authors have accorded considerable importance to the large head of *Kumba*, *Parakumba*, and a number of other genera, usually erecting monobasic genera based primarily on this feature. But should so much weight be given to a feature that appears to have evolved numerous times in macrourids and other related groups? For example, *Cetonurus*, *Cetonurichthys* Sazonov and Shcherbachev, 1982, *Coryphaenoides rupestris* Gunnerus, 1765, *Echinomacrus* Roule, 1916, *Kumba*, *Parakumba*, *Paracetonurus*, and *Pseudocetonurus* Sazonov and Shcherbachev, 1982 are all characterized by relatively large heads, and the condition seems to have reached an extreme in the peculiar macrouroidines *Squalogadus* Gilbert and Hubbs, 1916 and *Macrouroides* Smith and Radcliffe, 1912. Similarly enlarged heads are found in other deep-sea fishes, e.g., *Acanthonus* Günther, 1878 and *Typhonus* Günther, 1878 (both ophidiiforms), and *Momonatira* Paulin, 1985 (Mori-

dae). With the exception of *Paracetonurus*, with more than four species, *Cetonurus* and *Echinomacrus*, each with two species, and *Coryphaenoides rupestris*, which is one of more than 60 species (Iwamoto and Sazonov 1988), all other genera listed are monobasic. The diagnosis for *Cetonurichthys* is much the same as that for *Cetonurus*, except that the latter is characterized by its somewhat larger head. In a similar but opposite vein, the diagnosis for *Pseudocetonurus*, except for the expanded head and the replacement of the grooved lateral line scales with free neuromasts, agrees quite well with that for *Ventrifossa*. Perhaps relative head size has been over-emphasized as a generic character. If we exclude head size, our new species then fall readily into the circumscription of the genera *Kumba* and *Parakumba*, with the exception in the former of a smooth spinous dorsal ray and a reduced light organ. These last two characters—the only tangible differences between *Kumba* and *Parakumba*—we consider insufficient to continue recognition of the latter genus. We consider the smooth spinous dorsal ray of *Kumba* to be the end point of a transformation series beginning with the strongly serrated condition found in *K. japonica* and *K. hebetata*, to the weakly serrated spine of *K. maculisquama* and *K. gymnorhynchus*, to the totally smooth state in *K. dentoni*. Similarly, the small light organ in *K. dentoni*, externally manifested in a narrow periproct and small naked area before the anus, represents another reductive trait.

A special note must be made of *Nezumia liolepis*, which we have excluded from *Kumba* because of the small coarse scales along the leading snout edge, the lack of scales on the suborbital shelf, and the presence of scales on the ventral surface of the suborbital and mandible. The otherwise naked snout is very much like that in members of *Kumba*, the slender second spinous ray of the first dorsal is smooth or has much reduced serrations along the leading edge, and the periproct area is small, with only a rudimentary light organ, much as in *K. dentoni*. This particular combination of characters is similar to that in *Kumba*, yet it is different in its own way. It may well suggest some closer affinity that we have not been able to detect.

We feel that a more detailed analysis of other characters (especially osteological, myological, and other internal features) will help remove the

uncertainty of our current ideas of relationships, but that will remain undone until more specimens become available for study.

DESCRIPTIONS

Kumba Marshall, 1973

*Kumba Marshall*, 1973:616 (type species *Kumba dentoni* Marshall, 1973, by original designation)

*Parakumba Trunov*, 1981:27 (type species *Parakumba maculisquama* Trunov, 1981, by original designation).

DIAGNOSIS.—Branchiostegal rays 7. Anus in middle 1/3 of space between anal and pelvic fin bases, usually closer to latter. Luminescent organ with a single gland and lens in abdominal wall anterior to rectum. Most of dorsal surface of snout and almost entire ventral surfaces of snout, suborbital, and lower jaw naked. No terminal or lateral snout scutes present. Scales on upper surface of suborbital small, in several rows, each armed with small, erect spinules closely aligned in 1–3 comblike rows. Pelvic fin rays 8–12. Gillrakers, inner series of first arch 10–14 total (8–11 on lower limb).

DISTRIBUTION.—The genus is known from relatively few specimens collected in widely scattered localities. *Kumba japonica* is known from at least 12 specimens from off Japan and the Kyushu-Palau Ridge (Okamura in Okamura et al. 1982:147, 349, and our data), but the remaining eight species are known from only 10 specimens from Hawaii, the eastern and western Indian Ocean, off New Guinea and New Caledonia, the northeastern Atlantic, the mid-South Atlantic, and the Gulf of Mexico. Depth distributions range from about 550 m to about 1,600 m.

REMARKS.—We tentatively recognize nine species of *Kumba*. Four species are already described: *K. dentoni*, *K. maculisquama*, *K. hebetata*, and *K. japonica*. Three others are herein described and named. Descriptions and illustrations are provided for the other two, but they are not named because they are each represented by a single, small specimen in a mediocre state of preservation.

KEY TO THE SPECIES OF *KUMBA*

- 1 (8) Scaleless areas on upper surface of snout extend posteriorly onto forehead beyond lateral nasal angles ..... 2

- 2 (3) Head soft, without distinct ridges, sensory canals inflated, with open pores; interorbital width about 33% of HL, equal to snout length; barbel rudimentary, less than 3% HL; V. 10 ..... *K. maculisquama*
- 3 (2) Head firm, suborbital and nasal ridges distinct, sensory canals not inflated, pores present or absent; interorbital width shorter or longer than snout, both less than 32% HL; barbel 8–19% HL; V. 8–10 ..... 4
- 4 (5) Upper jaw short, about 34% HL ..... *K. sp. A* (Gulf of Mexico)
- 5 (4) Upper jaw long, 40% HL or more ..... 6
- 6 (7) Head sensory canals with enlarged pores; barbel about 16–19% HL; snout shorter than interorbital ..... *K. punctulata* n. sp.
- 7 (6) Head sensory canals without enlarged pores; barbel short, about 9% HL; snout longer than interorbital ..... *K. calvifrons* n. sp.
- 8 (1) Scaleless areas on upper surface of snout extend only to level of lateral nasal angles ..... 9
- 9 (10) Head soft, sensory canals inflated, snout longer than 33% HL; interorbital about 40% HL; no separate ADW, periproct only slightly expanded anteriorly ..... *K. dentoni*
- 10 (9) Head firm, sensory canals not inflated, snout shorter than 33% HL; interorbital less than 30% HL; ADW present, separate or within notable anterior projection of periproct ..... 11
- 11 (14) V. 10–13; upper jaws longer than 33% HL ..... 12
- 12 (13) V. 10–11; no large pores on head; barbel short, about 7% HL; orbit small, 26–27% HL, equal to or less than interorbital ..... *K. gymnorhynchus* n. sp.
- 13 (12) V. 12, rarely 11 or 13; pores in head present; barbel 21–33% HL; orbit large, more than 30% HL; greater than interorbital width ..... *K. japonica*
- 14 (11) V. 8; upper jaw length less than 33% HL ..... 15
- 15 (16) 1D. II,13; snout notably shorter than orbit ..... *K. hebetata*
- 16 (15) 1D. II,9; snout about equal to orbit. .... *K. sp. B* (Mozambique)

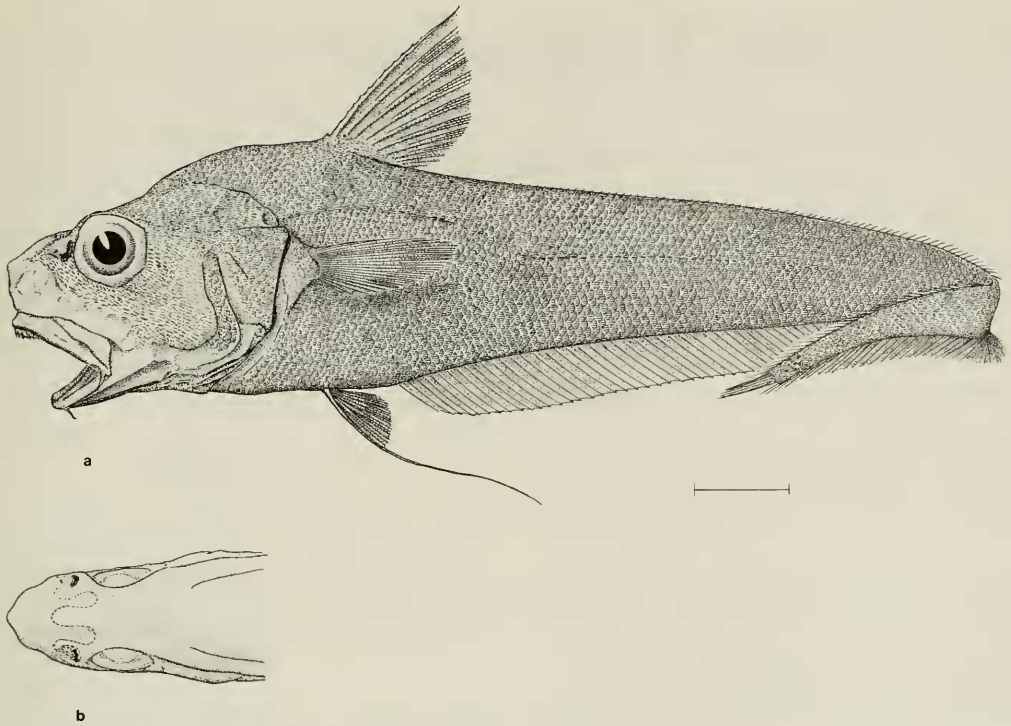


FIGURE 1. *Kumba calvifrons* new species. Holotype: ZMMGU P.17764, 270 mm TL, from Mid-Atlantic Ridge at equator, in 930–960 m. (a) Lateral view; (b) dorsal view of head to show extent of naked area on snout, indicated by dashed line. Fins and squamation partially reconstructed. Scale bar equals 25 mm.

### *Kumba calvifrons* new species

(Figure 1)

**MATERIAL EXAMINED.**—Holotype: ZMMGU P.17764 (75.5 mm HL, 370+ mm TL); Mid-Atlantic Ridge, 00°27'N, 16°52.2'W; 930–960 m; *R/V Chronometer* cr. 4, trawl 7; 20.VII.1979.

**DIAGNOSIS.**—Head firm, non-inflated; head sensory canals without enlarged pores; snout dorsally scaleless posteriorly onto forehead as two projections lateral to median rostral ridge (Fig. 1b); V. 8; orbit 27% HL; snout equal to orbit, 1.2 times longer than interorbital; upper jaw about 40% HL; ADW and PDW within scaleless thumb-shaped projection of periproct.

**COUNTS AND MEASUREMENTS.**—(see also DIAGNOSIS and Table 1). Scales below 1D. 15, below 2D. 13.5, below mid-base 1D. 8, lat. 1. over predorsal length 41. The following in percent HL: postrostral 76.2; pre-A. 145; pre-anus 127; V.-A. 36; isthm.-A. 68; body depth 90; 1D.-2D. 44; length 1P. 50.

**DESCRIPTION.**—General shape best seen in Figure 1. Dorsal profile of nape highly arched, giving humpbacked appearance. Head relatively deep (about 1.2 in HL), moderately compressed laterally, length about 4 or more in TL (a large pseudocaudal developed). Interorbital region with subtriangular concavity or depression posterior to median rostral ridge. Snout blunt, forming obtuse angle in dorsal and lateral profiles. Suborbital region subvertical, without strongly angular ridge. Scaled surfaces of opercle and subopercle form deep inverted triangle; free margins of preopercle, subopercle, and interopercle finely crenulated. Mouth large, little restricted at lateral corners; upper jaw extends to below midorbit or slightly beyond. Chin barbel tiny, length slightly less than diameter of posterior nostril. Gill openings wide, membranes broadly connected to isthmus with a posterior free fold. Opercular opening extends forward to below end of mandible.

Sensory canals on head not broadened or swol-

TABLE 1. Measurements and counts of *Kumba* spp. Abbreviations follow Iwamoto (1970) and Sazonov and Iwamoto (1988), except for following: *calv.* = *K. calvifrons*; *hebeta.* = *K. hebeta*; *macul.* = *K. maculisquamia*; *japon.* = *K. japonica*.

Measurements	sp. A		sp. B		<i>hebeta.</i>		<i>calv.</i>		<i>gymnorhynchus</i>		<i>macul.</i>		<i>japon.</i>				<i>punctulata</i>		<i>dentoni</i>											
	CAS	77314	CAS	50152	USNM	51608	ZMMGU	P.17764	ZMMGU	P.17766	CAS	77313	ZIN	43803	ZMMGU	P.17763	BSKU	32219	ZMMGU	P.17763	ZMMGU	P.17762	MNH	1994-34	BMNH	holo-	type			
TL	129+	25.1	165+	35.0	123	26.2	370+	75.5	496+	75.3	402+	267 <sup>a</sup>	153	112	127	210	112	89+	145+	220	220	39.6	39.6							
HL																														
In percent of head length																														
Snout	29.1		29.4		24.8		26.9		28.3		29.3	30.1 <sup>a</sup>	23.9	28.4	29.5	27.2	28.4	20	27.7	34.1	34.1									
Preoral	20.3		21.1		24.0		14.8		19.3		20.5	21	22.6	27.2	23.8	22.2	27.2	16	14.2	28.3	28.3									
Internasal	27.5		28.3		25.7		19.2		24.0		22.1	28	17.6	22.2	24.3	22.2	22.2	21	19.9	44.6	44.6									
Interorbital	24.7		25.7		27.8		22.0		26.4		26.6	35.3 <sup>a</sup>	23.5	24.7	27.6	24.7	24.7	25	31.5	39.9	39.9									
Orbit	30.3		28.9		32.4		27.0		25.6		26.1	29.2 <sup>a</sup>	35.6	42.6	37.1	42.6	42.6	43	36.7	27.1	27.1									
Suborbital	17.9		16.9		16.0		14.0		16.7		17.1	20.0 <sup>a</sup>	13.0	9.3	12.9	9.3	9.3	7.5	12.4	22.3	22.3									
Postorbital	44.6		47.4		42.4		48.6		51.5		48.2	45.0 <sup>a</sup>	39.1	33.3	39.5	33.3	33.3	28	40.1	45.6	45.6									
Orbit-preop.	37.8		43.4		40.5		44.5		50.1		48.6	44.3	36.9	38.3	34.8	38.3	38.3	38	36.3	48.4	48.4									
Upper jaw	33.9		31.7		31.7		40.4		42.6		40.4	38.0 <sup>a</sup>	38.1	38.9	38.9	41	38.9	41	39.7	34.6	34.6									
Barbel	8.0		10.9		—		8.9		—		6.6	3.2 <sup>a</sup>	24.8	27.2	24.8	27.2	27.2	19	15.7	6.0	6.0									
Gill slit	14.3		12.9		11.4		16.2		15.9		18.7	18.9 <sup>a</sup>	20.0	15.4	19.0	15.4	15.4	23	20.6	20.6	20.6									
V.	112		100		93		80		67		63	70.8 <sup>a</sup>	61	71	57	—	—	71	60	61	61									
Post. nostril	4.4		6.3		8.2		8.7		5.6		6.1	5.5	7.0	—	—	—	—	11.2	10.9	6.3	6.3									
Counts																														
ID.	11,11		11,9		11,13		11,11		11,10		11,10	11,9 <sup>a</sup>	11,10	11,10	11,11	11,10	11,10	11,11	11,11	11,9	11,9									
IP.	i20/i19		i20/i20		i23/i24		i19/i19		i22/i22		i20/i21	i20/i21	i19/?	i21/i21	i20/i21	i22	i22	i22	i22	i22	i22									
V.	8/8		8/8		8/8		8/8		10/11		10/10	10/10 <sup>a</sup>	11/11	12/12	12/12	9/9	9/9	9/9	10/10	10/10	10/10									
GR-I	8/2+10		9/2+8		8/1+9		9/3+11		11/3+10		11/2+10	10/2+10 <sup>a</sup>	10/2+10	8/2+11	9/2+10	9/2+10	9/2+10	9/2+10	9/2+10	9/2+10	9/2+10									
GR-II	2+9/2+9		2+8/2+8		1+9/2+9		2+10/3+10		2+10/2+10		2+11/2+11	1+10/1+11 <sup>a</sup>	2+9/2+11	2+12/2+10	2+9/2+10	2+9/2+10	2+9/2+10	2+9/2+10	2+9/2+10	2+10/2+10	2+10/2+10									
Pyl. caeca	>70		>50		—		—		—		—	—	25-28 <sup>b</sup>	—	—	—	—	—	—	—	—									

<sup>a</sup> Data from Trunov 1981.

<sup>b</sup> Data from Okamura 1970a.

len. Open pores absent in all canals except on preopercle, where single pore exits at dorsal edge of bone. This pore tubular (tube declined posteriorly), surrounded by narrow area of naked skin. Free neuromasts serially arranged (between scales) along scaled surfaces of infraorbital, supraorbital, and preopercular canals; those on naked areas of above canals and along mandibular canal irregularly placed. Small, thin-walled black tubules possibly representing modified sensory pores present along horizontal portion (below orbit) of infraorbital canal (3 tubules) and along vertical arm of canal (1), along medial border of mandibular canal (3), and near ventral margin of preopercular canal (4). Small black papillae scattered on naked parts of snout and lower portion of infraorbital shelf, and on lips.

Olfactory cavity small, its length about equal to pupil diameter. Anterior nostril round, small, bordered posteriorly by semitubular flap of skin about twice as high as diameter of anterior nostril. Posterior nostril large, oval, its longer axis 8.7% HL. Approximately 22–24 olfactory lamellae.

Premaxillary teeth uneven in size, those along outer margin notably enlarged, conical, slightly curved inwardly, tips somewhat arrowhead shaped. Largest of these emarginate teeth anterior, size gradually decreasing posterior to where they are scarcely longer than those from inner rows. Left premaxillary has 21 enlarged teeth, right premaxillary 18. As many as 7 or 8 teeth in a section across premaxillary. Inner rows of teeth uniformly small and arranged in 7 subparallel, oblique strips, each strip making acute angle with bone margin (similar to premaxilla illustration of *Caelorinchus jordani* in Okamura 1970b:25, Fig. 14L). Dentary teeth uniformly small and arranged similar to those on premaxillary but more irregular near symphysis, where there are 4 or 5 teeth in transverse section; length of subparallel tooth strips lessens rapidly posteriorly.

Head scaled except for following: undersides of snout and suborbital shelf to vertical through posterior margin of orbit; mandibular rami; lower portion of preopercular flap; gular and branchiostegal membranes; upper surface of snout posteriorly along both sides of median nasal ridge about to level of anterior  $\frac{1}{2}$  of orbits (Fig. 1b). Supranarial ridges scaled, as well as area from lateral snout angle posteriorly along suborbital shelf to sides of head. Broad interopercle scaled

only at exposed posterior tip with small, non-spinulated scales. Fin membranes and narrow band around base of first dorsal naked.

Scales on head with fine, short, needlelike spinules that are only slightly reclined from vertical and arranged, with bases confluent, in close, tight, comblike rows; no reticulate pattern. Usually only 1–6 comblike rows on smaller scales of head, but as many as 2–7 on large scales of interorbital, postorbital canal, cheek, and operculum. Almost all scales dorsally on snout small, elliptical, with single comblike file of spinules. Scales on suborbital shelf small, oval, scarcely imbricate, unthickened, 4–6 irregular scale rows present across narrowest part of shelf (6–8 rows before or behind this point), most scales here with single, median, comblike row of spinules, some posteriorly with 1 or 2 divergent spinule rows on either side of median row.

Body scales small and similar to those of head except that spinules more reclined and the 8–10 rows more numerous and essentially parallel. Those under cleithrum, behind pectoral base, and behind and lateral to first dorsal base smooth or faintly ridged. Scales on chest with 3–6 slightly divergent rows of conical, reclined spinules. Scales dorsally on sides of body with strongly reclined spinules in 8–12 parallel ridge rows, none of spinules enlarged, those posteriormost extend beyond scale margin.

Lateral line gently curved from postorbital canal to vertical from origin of second dorsal, becoming straight caudally. Lateral line scales with 1 or 2 short rows of notably reclined conical spinules on each side of canal tube, rarely spinules absent.

A slender, teardrop-shaped, black ADW between pelvic fins (and behind insertions of pelvic fin bases) connected by narrow isthmus to broad, scaleless periproct region, the PDW immediately fronting anus. Anus closer to pelvic insertions than to anal origin, separated by about 15 scales from anal fin.

Fin positions best seen in Figure 1a. Leading edge of second spinous dorsal ray with low, widely spaced, non-overlapping, almost indistinct serrations. Interspace between dorsal fins about 1.4 times length base of first dorsal fin. Outer pelvic ray produced, extending to base of 13th anal ray.

Color overall gray-brown. Belly, operculum, naked surfaces of head, gular and branchiostegal membranes, and iris dark brown to black. Bar-

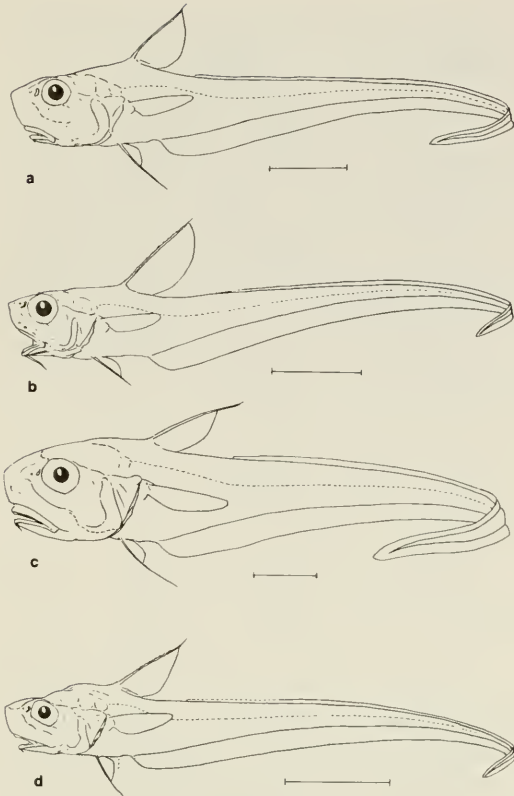


FIGURE 2. Diagrammatic lateral views of: (a) *Kumba dentoni* (adapted from Marshall 1973); (b) *Kumba japonica*, ZMMGU P.17663, 112 mm TL, probably from Kyushu-Palau Ridge; (c) *Kumba maculisquama*, holotype, ZIN 43803, 267 mm TL, from South Atlantic, in 1,350–1,600 m; (d) *Kumba* sp. A, CAS 77314, 129+ mm TL, from Gulf of Mexico, in 1,280 m. Scale bars equal 25 mm.

bel, lining of oral cavity, maxillary, and lateral sides of dentary pale. Skin covering premaxillary and upper and lower lips brown. First dorsal blackish brown overall, pale distally behind third branched ray. Paired fins brownish black basally, dusky distally. Anal fin brownish black to dusky over anterior two-thirds, pale posteriorly.

**DISTRIBUTION.**—Known only from the holotype taken at the equator on the Mid-Atlantic Ridge, in 930–960 m.

**ETYMOLOGY.**—From the Latin *calvus*, bald, and *frons*, forehead, in reference to the naked snout and forehead in this species.

**COMPARISONS.**—*Kumba calvifrons* shows notable differences from most of its congeners in proportional measurements of the head, the val-

ues usually being smaller for the preoral, inter-nasal, interorbital, and suborbital lengths, and slightly larger for the length posterior nostril (see Table 1). It further differs from *K. gymnorhynchus* in having fewer pelvic fin rays, a slightly shorter orbit-preopercle distance, and in having naked areas on the dorsal surface posterior to the snout. *K. calvifrons* further differs from *K. hebetata*, species A, and species B in having a longer upper jaw and longer outer gill slit. *K. japonica* has much larger orbits, longer barbel, and more pelvic fin rays. *K. punctulata* shows a number of morphometric differences from *K. calvifrons* as well as a higher pelvic ray count and enlarged head sensory pores.

### *Kumba dentoni* Marshall, 1973

(Figure 2a)

*Kumba dentoni* Marshall, 1973:617–618, Fig. 36 (holotype BMNH 1961.1.30.6, 220 mm TL, Bay of Biscay, 47°37'N, 7°29'W; 1207 m).

**DIAGNOSIS.**—Head large, rather soft, inflated, the head sensory canals with small pores; scaleless areas dorsally on snout extend to level of anterior nostril; V. 9; orbit diameter about 28% HL; snout much longer than orbit, about 1.1 into broad interorbital; light organ poorly developed, visible only as a small, naked, black projection anterior to anus. Spinous second ray of first dorsal fin smooth.

**COUNTS AND MEASUREMENTS.**—(provided by Y. N. Shcherbachev; see also Table 1). Scales below 1D. 11, below 2D. 6, below mid-1D. 8. The following in percent of HL: postrostral 71; pre-A. 125; pre-V. 103; V.-A. 29; isthm.-A. 53; body depth 75, depth over A. origin 58; height 1D. 63; length 1P. 51; length V. 61; length base 1D. 30.

**DESCRIPTION.**—We have not examined the holotype, but our colleague, Y. N. Shcherbachev of IOAN, provided the following information from his examination in 1991: scales over suborbital shelf with a single row of spinules; other scales on head with diverging rows of spinules, those on body with 4–8 almost parallel spinule rows. Premaxillary teeth with up to 4 rows anteriorly, outermost teeth enlarged, those on lower jaw in 2 or 3 rows.

**REMARKS.**—We can add nothing to the rather brief original description of the species, which is known from a single specimen taken in the northeastern Atlantic in the Bay of Biscay.



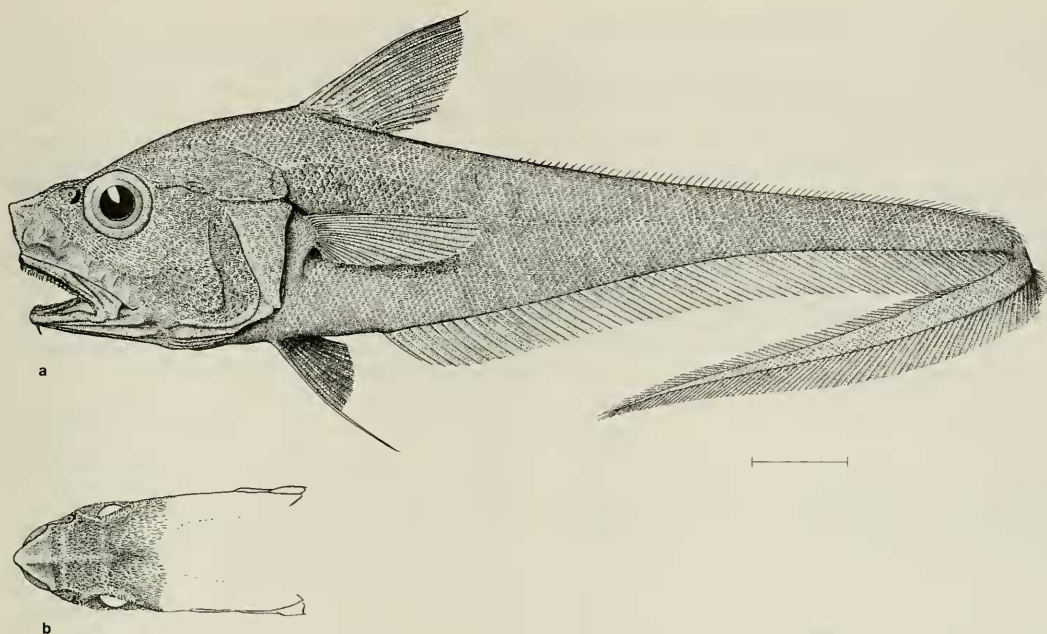


FIGURE 3. *Kumba gymnorhynchus* new species. (a) Lateral view of holotype, CAS 77313 75.3 mm HL, 496+ mm TL, from West Australian Ridge in 1,260–1,370 m; (b) dorsal view of head showing extent of naked area on snout. Fins and squamation partially reconstructed. Scale bar equals 25 mm.

### *Kumba gymnorhynchus* new species

(Figures 3, 4)

**HOLOTYPE.**—CAS 77313 (formerly ZMMGU P.17765)(68.3 mm HL, 402+ mm TL); West Australian Ridge (Broken Ridge), 30°46'S, 93°20'E; 1,260–1,370 m; *R/V Zvezda Kryma* cr. 6, trawl 162; 26.IX.1976. **PARATYPE:** ZMMGU P.17766 (75.3 HL, 496+ TL); same data as for holotype.

**DIAGNOSIS.**—Head firm, non-inflated head sensory canals lacking pores; scaleless areas dorsally on snout extend to lateral nasal angles but not onto forehead; V. 10–11; orbit diameter about 26% HL; snout slightly longer than orbit; interorbital about equal to orbit; upper jaw 40–43% HL; ADW and PDW situated within scaleless anterior projection of periproct.

**COUNTS AND MEASUREMENTS.**—(see also DIAGNOSIS and Table 1; holotype marked with asterisk if different from paratype). Scales below 1D. 11\*, 13, below 2D. 11\*, 12–13, below mid-base 1D. 8–9\*, 13–14, lat. I. over predorsal length 41\*, 44. The following in percent HL: postrostral 74.9\*, 73.2; pre-A. 132\*, 131; pre-anus 117\*, 116; V.-A. 30; isthm.-A. 65\*, 58; body depth



FIGURE 4. Scanning electron micrograph of scale from dorsum of holotype of *Kumba gymnorhynchus*. Scale bar (dotted line) equals 1.25 mm.

81\*,-; 1D.-2D. 44\*, 31; length 1P. 59\*, 58; length V. 67\*, 63.

**DESCRIPTION.**—General shape best seen in Figure 3. Dorsal profile of nape gently convex from level of orbit to origin of first dorsal. Head moderately deep, compressed laterally, maximum head width less than depth at mid-orbit, about equal to postorbital length, head length about 5.3 into TL. Interorbital space deeply concave except for median rostral ridge, but concavity may be a result of preservation-caused shrinkage. Snout moderately high, profile of upper and lower margins form approximately a right angle in lateral view. Suborbital, nasal, and median rostral ridges conspicuous, probably more so from shrinkage. Suborbital region vertical, without a strongly angular ridge, although demarcation of broad, densely scaled dorsal shelf strongly set off from naked underside. Mouth large, subterminal, upper jaw extends posteriorly to below mid-orbit. A minute chin barbel, scarcely visible, shorter than diameter of posterior nostril. Preopercle large, broadly rounded, the upper margin inclined forward. Subopercle attenuated ventrally into subtriangular projection, its posterior margin gently concave. Exposed posterior tip of interopercle subtriangular and weakly scaled. Free margins of subopercle, interopercle, and preopercle crenulated. Opercular opening broad, extends forward under head to below posterior end of mandible or slightly forward of that. Gill membranes connect narrowly under isthmus, forming a free posterior fold.

Sensory canals on head similar to those described for *K. calvifrons*, except that postorbital canal wider and no open pores present. Free neuromasts scarcely visible on scaled parts of sensory canals or naked head surfaces. Small black papillae restricted to lips.

Olfactory cavity small, its length about  $\frac{3}{4}$ ths pupil diameter; anterior nostril round, small, bordered posteriorly by semitubular flap slightly higher than diameter of anterior nostril. Posterior nostril large, broadly oval, its long axis 5.6–6.1% HL; 16 olfactory lamellae in holotype.

Premaxillary and mandibular teeth as described for *K. calvifrons* except oblique strips of teeth of premaxillae more dense, more irregularly placed, and teeth increase in size toward outer margin. Emarginate premaxillary teeth enlarged, 21 on each side; smallest posteriormost teeth lacking arrow-head tips.

Squamation of head similar to that of *K. cal-*

*vifrons* except for absence of posterior extension of naked areas onto forehead. Scales covering suborbital shelf each with 1 or 2 diverging ridges of spinules; as many as 5 rows of scales on narrowest part of shelf. Scales on postorbital sensory canal notably enlarged. Reticulate pattern on scales well developed. Few body scales (Fig. 4) remain. Those on nape and chest with 3–7 diverging rows of reclined spinules. Scales cover membranes of basal parts of pelvic, pectoral, and first dorsal fins; these scales lack ridges, occasionally have a single spinule. Similar scales present along both sides of anal fin base.

Lateral line gently curved from postorbital canal to vertical through origin of second dorsal fin, then straightens caudally. Lateral-line scales with one or no spinules, but often with trace of ridges above or below canal tubes.

Light organ externally similar to that of *K. calvifrons*, although a PDW not distinguishable within subtriangular naked projection of periproct. About 10–12 scales between anal fin and rear margin of periproct.

Stomach in mature female holotype everted. Swim bladder thin walled, narrowly oval, its posterior end extends to level of 8th anal fin ray; the abdominal cavity extends to 12th ray. Two gas glands in posterior  $\frac{1}{4}$  of bladder, with 2 long, narrow, and straight retia.

Fin positions best seen in Figure 3. Leading edge of spinous second ray of first dorsal fin with 7 fine, greatly reclined spinules in holotype; tip filamentous but short. Interdorsal space 1.1–1.4 times length base of first dorsal. Outer pelvic ray produced, threadlike, extends to base of 9th or 10th anal ray.

Color in alcohol dark brown overall. Dorsally and anteriorly on head lighter brown; anteriorly on lower jaw and entire barbel pale. Operculum, gill, abdominal and chest areas darker, more swarthy. Upper lips black. Fins pale to dusky; but pelvic base dark. Orbit narrowly ringed in black. Mouth lining gray. Gill-chamber walls blackish along outer and upper margins, pale medially and antero-ventrally over cleithrum and on epibranchial and ceratobranchial. Peritoneum pale with randomly scattered small chromatophores.

**ETYMOLOGY.**—From the Greek, *gymnos*, naked, and *rhynchos*, snout. The name is to be treated as a noun in apposition.

**DISTRIBUTION.**—Known only from one collection in the eastern Indian Ocean on the West

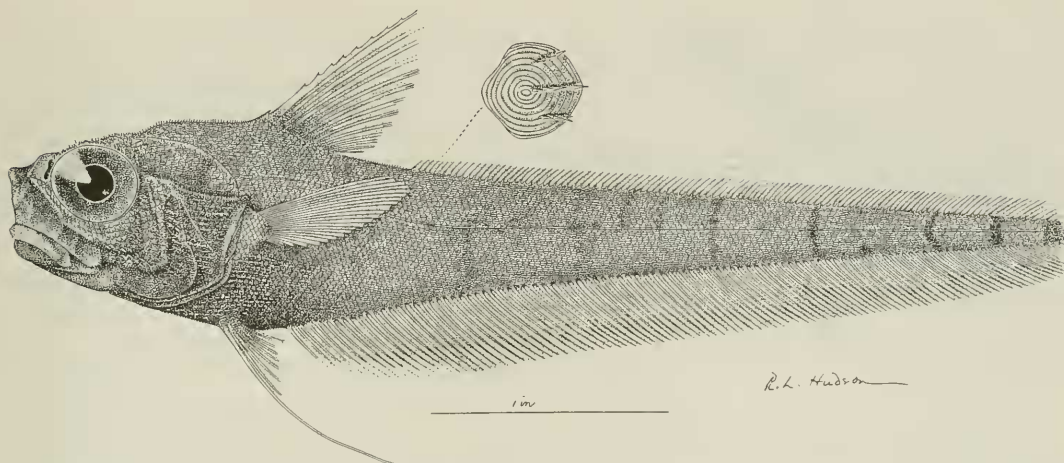


FIGURE 5. *Kumba hebetata*. Holotype, USNM 51608, from off southern coast of Oahu, Hawaii, in 497–591 m. From copy of original drawing by R. L. Hudson, published in Gilbert (1905, Fig. 262). Scale bar equals one inch (25.4 mm). (Note: chin barbel not drawn, but present in specimen.)

Australian Ridge (= Broken Ridge), in 1,260–1,370 m.

COMPARISONS.—*Kumba gymnorhynchus* is closely similar in overall appearance to *K. calvifrons* but differs in having the naked area on the dorsal surface of the snout abruptly ending along a line between the lateral nasal angles, without posterior extensions. The mouth is also grayish overall (vs. completely pale), the mandibular dentition is in a narrower band that becomes slightly constricted anterolaterally (vs. moderately broad, uniformly tapered band), opercular opening extends farther anteriorly, and there are slight differences in morphometry (see DIAGNOSIS and Table 1). The 10 or 11 pelvic fin rays of *Kumba gymnorhynchus* distinguishes it from others of the genus except *K. maculisquama*, *K. punctulata* (holotype only), and *K. japonica*, but those species are highly distinctive in their own ways (see descriptions of those species). *Kumba gymnorhynchus* appears to have the smallest orbit, and commensurately, the longest postorbital and orbit-to-preopercle distances, but these differences may simply be size related.

### *Kumba hebetata* (Gilbert, 1905)

(Figure 5)

*Macrourus hebetatus* Gilbert, 1905:671–672, Fig. 262 (Hawaii).

MATERIAL EXAMINED.—Holotype: USNM 51608 (26.2 mm HL, 123 mm TL); off south coast of Oahu; *Albatross* st. 3925; 299–323 fms (547–591 m); 7.V.1902.

DIAGNOSIS.—Scaleless areas dorsally on snout extend only to level of lateral nasal angles; 1D. II, 13; 1P. i23–i24; V. 8; orbit about 32% HL; snout short, blunt, about  $\frac{3}{4}$  orbit, slightly less than interorbital; barbel small,  $\frac{1}{4}$  orbit diameter.

COUNTS AND MEASUREMENTS.—(see also Table 1). Scale rows below 1D. about 13, below 2D. about 10, lat. l. over pre-D. length 46. The following in percent HL: pre-A. 131; pre-anus 119; isthm.-A. 59; anus-A. 30; height 1D. about 77; length 1P. 62; 1D.-2D. 32.

DISTRIBUTION.—Hawaiian Islands.

REMARKS.—Gilbert's (1905) original description and illustration of the holotype are excellent, and we can add little new. No other specimen has been collected, as far as we know. Iwamoto's (1986) record of the species from the Indian Ocean off southern Africa was based on the specimen here reported as *Kumba* sp. B, but differences in counts of the first dorsal and pectoral fins, and the length of the snout, suggest that the two represent separate species.

### *Kumba japonica* (Matsubara, 1943)

(Figure 2b)

*Lionurus japonicus* Matsubara, 1943:149–152, Fig. 9 (holotype: FAKU 1951, 176 mm TL; Kumano-Nada, Japan;

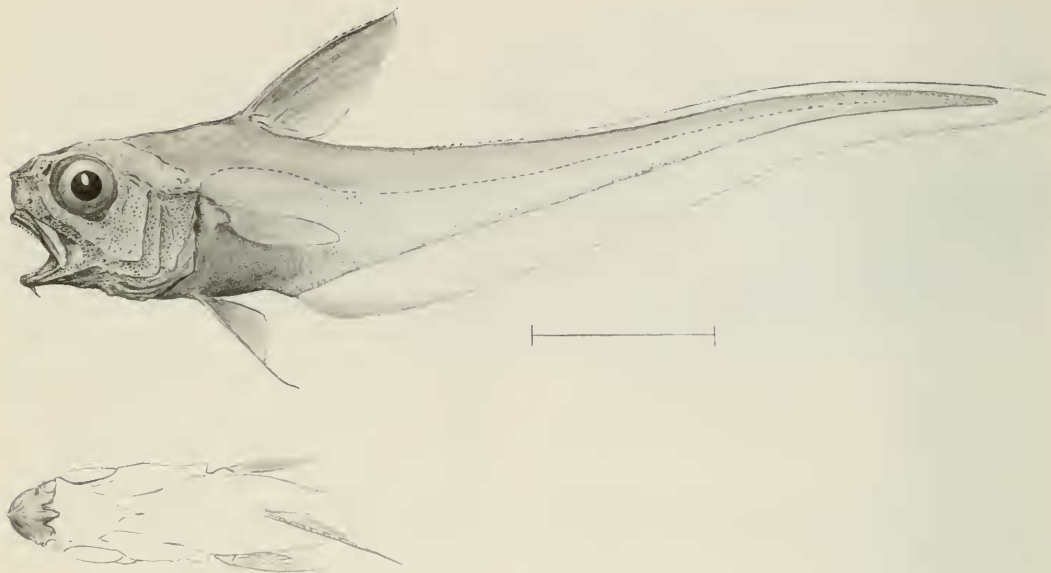


FIGURE 6. *Kumba punctulata* new species. Holotype: MNHN 1994-34, 145+ mm TL, from off New Caledonia in 530 m. (a) Lateral view; (b) dorsal view of head to show extent of naked area on snout, indicated by shading. Scale bar equals 25 mm.

paratype FAKU 1938, 155 TL). Kamohara 1959:8 (Tosa Bay, Japan).

*Nezumia japonicus*: Okamura 1970a:88-91, Pl. 19, Text-fig. 39 (descr.).

*Ventrifossa japonica*: Okamura in Okamura et al. 1982:147, 349, Fig. 91 (10 spec.; s. Japan and Kyushu-Palau Ridge, 550-710 m).

MATERIALS EXAMINED.—ZMMGU P.17763 (2, 16.2-23 mm HL, 112-153 mm TL); western Pacific, probably over Kyushu-Palau Ridge; Prof. Derjugin tr. 189; 13.V.1971. BSKU 32219 (21.0 HL, 127 TL); Tosa Bay, Japan.

DIAGNOSIS.—Head firm, non-inflated head sensory canals with prominent pores; scaleless

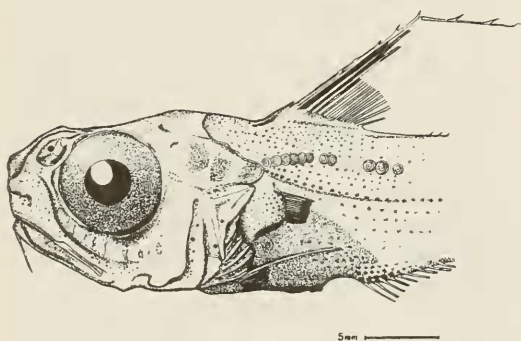


FIGURE 7. *Kumba punctulata* new species. Paratype, ZMMGU P.17762, prejuvenile from off New Guinea, captured in a midwater trawl between 0 and 1,000 m.

area on dorsal surface of snout extends only to lateral nasal angles; V. 11-12; orbit 36-43% HL, snout and interorbital much shorter than orbit, snout about 1.25-1.5, interorbital 1.4-1.7 into orbit; ADW and PDW lens-like and widely separated. Three small black pigmented areas near mid-length of anal fin base. Pyloric caeca 40-52.

REMARKS.—This species has been well described by Matsubara (1943) and Okamura (1970; 1982), with a good color figure provided in the last reference. It has the best-developed light organ and sensory head pores, longest barbel, largest eyes, and highest pelvic ray count of the genus. Many features are suggestive of the genus *Ventrifossa*, to which it has been attributed by Okamura (in Okamura et al. 1982), but the extensive naked areas on the head and the distinctive spinulation on the head scales support its placement in *Kumba*. *Kumba japonica* is probably a small species, as all representatives captured so far have failed to exceed 170 mm. The largest specimen in our collection was an immature male with small testes.

#### *Kumba maculisquama* (Trunov, 1981)

(Figure 2c)

*Parakumba maculisquama* Trunov, 1981:30-35, Figs. 1-4 (mid-South Atlantic).

**MATERIAL EXAMINED.**—Holotype: ZIN 43803 (56.6 mm HL, 267 mm TL); 37°09'S, 07°38'W; in 1,350–1,600 m; 5.I.1978.

**DIAGNOSIS.**—Head large, rather soft, inflated, the head sensory canals with small pores; scaleless areas dorsally on snout extend onto forehead; V. 10; orbit diameter about 29% HL; snout about equal to orbit, about 1.1 into broad interorbital; ADW and PDW well developed, at either end of long periproct region, the two separated by narrow isthmus.

**REMARKS.**—Trunov's (1981) original description and illustration of the single representative are thorough and accurate. No other specimen has been found in collections we examined. The very broad, inflated head readily distinguishes this species from all others of the genus except *K. dentoni*, which has weaker scales, a poorly developed light organ, and a smooth dorsal spine.

### ***Kumba punctulata* new species**

(Figures 6, 7)

**MATERIAL EXAMINED.**—Holotype: MNHN 1994-34 (26.7 mm HL, 145+ mm TL); off New Caledonia, 20°54'S, 168°21'02"E; 530 m; trawl; *Vauban* SMiB3, st. CP.4; 20.V.1987. Paratype: ZMMGU P.17762 (13.4 mm HL, 89+ mm TL); Bismark Sea off New Guinea, 5°20.9'S, 146°16'E; 1,000–0 m; IKMWT, 3000m.w.o.; *R/V Dimitry Mendeleev* cr. 18, sta. 1549; 16.II.1977.

**DIAGNOSIS.**—Head firm, non-inflated head sensory canals, with conspicuous pores; configuration of naked areas on snout as in *K. calvifrons*; V. 9 or 10; orbit 37–43% HL; snout about  $\frac{1}{2}$ – $\frac{3}{4}$  orbit, about 1.1–1.3 times into interorbital width; upper jaw 40–41% HL; barbel 16–19% HL.

**MEASUREMENTS.**—(in percent of HL; see also Table 1) Postrostral 78; pre-A. 142; pre-anus 97; V.-A. 13; greatest body depth 71; 1D.-2D. interspace 37; height 1D. 86; length 1D. base 30; length 1P. 60; length V. 70.

**DESCRIPTION OF HOLOTYPE.**—(paratype data in parentheses). General shape of adult seen in Figure 6 (of prejuvenile in Fig. 7). Head 0.9 (1.4) into greatest body depth, greatest width 0.7 (1.5) into postorbital length; body compressed laterally, gradually tapering posteriorly, tip of tail missing in holotype. Orbit large, greater than snout length, slightly greater than interorbital width. Suborbital width about 3 (6) in orbit. Upper jaw extends posteriorly to below posterior  $\frac{1}{2}$  of orbit. Chin barbel thin, tapered to a fine tip,

its length about equal to snout length. Preopercle broadly rounded, not lobelike posteriorly.

Premaxillary teeth in moderate band, 3–4 rows laterally (in juvenile paratype uniserial laterally, in 2 rows anteriorly); outer teeth larger than those of inner row. Mandibular teeth irregularly set, about 2 rows laterally, 4–5 rows near symphysis; none enlarged.

Light organ well developed; a large oval anterior expansion of periproct containing PDW has a narrow isthmus connected to large ADW, whose anterior border lies slightly forward of line between insertions of pelvic fins (well behind line in paratype).

Fin positions of holotype best seen in Figure 6. Pelvic fin origin well in advance of vertical from pectoral origin. Outer pelvic ray elongated, extending to base of 5th anal fin ray. Leading edge of 2nd spinous ray of 1D. with about 14 denticles (about 5 in paratype); height of ray slightly greater than HL. Interdorsal space 1.25 times longer than 1D. base.

Color medium brown overall, belly dark. First dorsal, pectoral, and pelvic fins all uniformly dark; anal fin dusky. Barbel pigmented basally, pale distally. Lower gill cover walls pale, otherwise cavity dark.

**SIZE.**—To at least 150 mm TL

**ETYMOLOGY.**—From Latin, *punctulatus*, dotted, in reference to the dense covering of melanophores on the head.

**DISTRIBUTION.**—Currently known only from the Coral Sea off New Caledonia and off northeastern New Guinea.

**REMARKS AND COMPARISONS.**—Represented by a single pelagic-stage prejuvenile and a mature female with large ovaries. The new species is most similar to *Kumba japonica* in its overall physiognomy and in having prominent open pores of the head sensory canals. *Kumba punctulata* differs, however, in having a broader interorbital (31% HL vs. 24–28%), shorter preoral length (14% vs. 23–27%), fewer pelvic fin rays (9–10 vs. 11–12), and a shorter barbel (16% vs. 25–27%). It also lacks the three black pigment marks long the base of the anal fin that characterizes *K. japonica*. The KEY TO SPECIES provides characters for distinguishing *K. punctulata* from other congeners. In many ways, *K. punctulata* appears very close to members of *Lucigadus* and probably would be assigned to that genus were it not for the extensive naked areas on the head.

**Kumba sp. A**

(Figure 2d)

**MATERIAL EXAMINED.**—CAS 77314 (25.1 mm HL, 129+ mm TL); western Gulf of Mexico off Brownsville, Texas, 25°05'N, 96°00'W; 1,280 m; *R/V Oregon* sta. 4803; 7.IV.1964.

**DIAGNOSIS.**—Head firm, non-inflated head sensory canals without enlarged pores; naked area dorsally on snout extends posteriorly beyond lateral nasal angles about to level of anterior orbital margin; V. 8; orbit 30% HL; snout about equal to orbit, about 1.2 times interorbital width; upper jaw about 34% HL; ADW teardrop-shaped, connected to periproct by a narrow isthmus.

**COUNTS AND MEASUREMENTS.**—(see also **DIAGNOSIS** and Table 1). Scales below 2D. 11 or 12, below mid-base 1D. 7.5, lat. 1. over predorsal length 42. The following in percent HL: postrostral 73.3; pre-A. 122; pre-anus 113; V.-A. 30; isthm.-A. 68; body depth 72; 1D.-2D. 30; height 1D. 76; length base 1D. 32; length 1P. 61.

**DESCRIPTION.**—General features seen in Figure 2d. Head length about 5 in TL, moderately compressed laterally, greatest depth about 2 in length; body long, gradually tapering, depth at point twice HL from tip of snout about equal to postorbital length of head. Snout protruding slightly beyond mouth; snout broad, width between lateral nasal ridges slightly more than interorbital width. Orbit large, long axis slightly oblique. Suborbital region broad, about 0.6 into orbit. Preopercle large, broadly rounded posteriorly, the posterior margin inclined forward. Upper jaw extends posteriorly to below midorbit. Chin barbel small, thin, length less than twice diameter of posterior nostril. Gill filaments short, longest about equal to length chin barbel. Gill rakers more or less tubercular. Gill membranes narrowly united over isthmus, forming a free posterior fold. Opercular opening extends forward to posterior end of mandibles.

Teeth in villiform tapered bands, 4–6 rows wide. Teeth short and rather bluntly tipped. Outer premaxillary teeth slightly enlarged and spaced.

Scales of suborbital as described for *K. calvifrons*. Naked areas of snout, suborbital, lower jaw, and preopercle similar to that of *K. calvifrons*, including posterior extension of naked areas beyond level of lateral nasal angles. Characteristics of spinulation on body scales not known because these scales almost completely missing.

Pyloric caeca thick, short; about 70 distal el-

ements counted. Light organ relatively small; ADW extends forward from periproct area, falling short of level of pelvic fin insertions.

Fin positions best seen in Figure 2d. Pelvic fin origin anterior to that of pectoral and first dorsal fins; anal fin origin below posterior 1/3 of base of first dorsal. Interspace between first and second dorsals about equal to length of base of first dorsal. Second dorsal poorly developed throughout. First dorsal about equal to postrostral length of head; spinous second ray with 4 widely spaced spinules. Outer pelvic ray produced into a long, thin filament that extends posteriorly to base of 20th anal ray.

Color mostly lost after almost 20 years in 40% isopropanol. Body and tail appears to have been relatively dark; narrow vertical dark bands still apparent on tail, reminiscent of condition illustrated by Gilbert (1905: Fig. 262) for *P. hebetata*.

**DISTRIBUTION.**—Known only from the single specimen taken in the western Gulf of Mexico in 1,280 m.

**REMARKS AND COMPARISONS.**—The only known specimen of this species is a juvenile with head and body almost completely denuded of scales. Characteristic scales remain on the suborbital shelf and on top of the head, however, to verify these diagnostic features of the genus. Scale pockets indicate the extent of scaled versus naked areas on the head.

The species appears to be close to *K. hebetata* and *K. calvifrons* in having similar naked areas over the snout and similar pelvic fin ray counts. It further resembles the holotype of *K. hebetata* in having faint vertical bands on the tail—undoubtedly a juvenile feature. But the longer snout (29.1% HL vs. 24.8%) with higher dorsal profile, the fewer pectoral fin rays (i19–20 vs. i23–24), the fewer denticles on the leading edge of the spinous first dorsal ray, and other less-pronounced morphometric and meristic features serve to distinguish the two. *Kumba* sp. A is very similar to *Kumba* sp. B in most morphometric and meristic features, but differs in having slightly shorter measurements of the postorbital and orbit-to-preopercle lengths, a slightly higher first dorsal ray count, and slightly more gill rakers on the outer series of the first arch. The naked area on the dorsal surface of the snout also extends farther back, posterior to the lateral angles of the snout, compared with only to the lateral angles in *Kumba* sp. B.

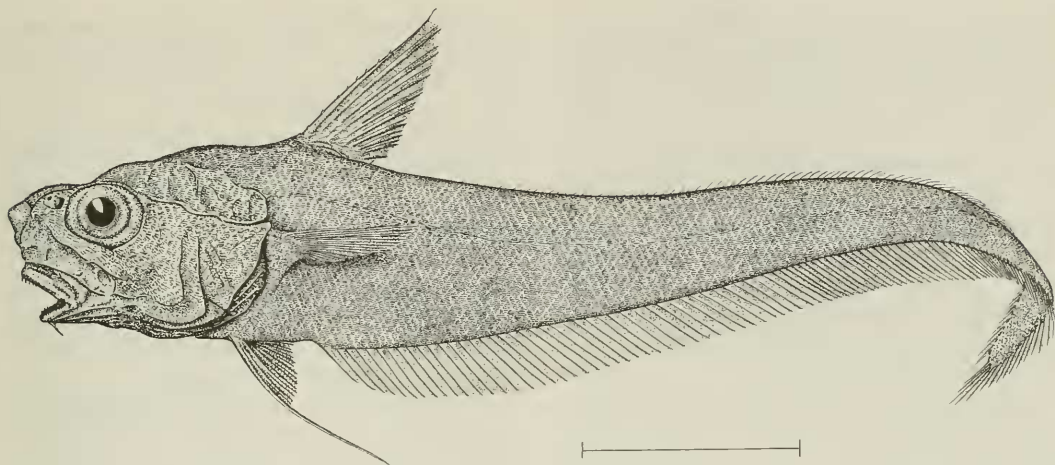


FIGURE 8. *Kumba* sp. B. CAS 50152, 165+ mm TL, from off Mozambique, in 850–960 m. Fins and squamation partially reconstructed. Scale bar equals 25 mm.

### *Kumba* sp. B

(Figure 8, 9)

*Nezumia hebetata*: Iwamoto, 1986:338 (nec *Macrurus hebetatus* Gilbert, 1905) (brief descr. of CAS 50152 from Mozambique).

**MATERIAL EXAMINED.**—CAS 50152 (35.0 mm HL, 165+ mm TL); off Mozambique; 22°30'S, 36°09'E; 850–960 m; otter trawl; *R/V Anton Bruun* cr. 8, sta. 399B; 1.X.1964.

**DIAGNOSIS.**—Head firm, non-inflated head sensory canals without enlarged pores; naked area dorsally on snout extends posteriorly to lateral angles but not beyond; V. 8; orbit 29% HL; snout about equal to orbit, about 1.1 times interorbital width; upper jaw about 32% HL; ADW teardrop-shaped, connected to periproct by a narrow isthmus.

**COUNTS AND MEASUREMENTS.**—(see also DIAGNOSIS and Table 1). Scales below 2D. 13, below mid-base 1D. 8.5, lat. 1. over predorsal length 38. The following in percent HL: postrostral 75.4; pre-A. 127; pre-anus 111; V.-A. 31; isthm.-A. 64; body depth 74; 1D.-2D. 36; height 1D. 69+; length base 1D. 27; length 1P. 57.

**DESCRIPTION.**—General shape seen in Figure 8. Head about 1.2 of greatest body depth, greatest width about equal to postorbital length; body moderately compressed laterally, gradually tapering; body depth at point twice HL behind tip of snout about equal to postorbital length of head; straplike tail with large part of tip missing, a

pseudocaudal developed. Orbit large, about equal to snout length, more than interorbital width. Ventral profile of snout elevated, snout blunt, slightly protruding beyond mouth; least width

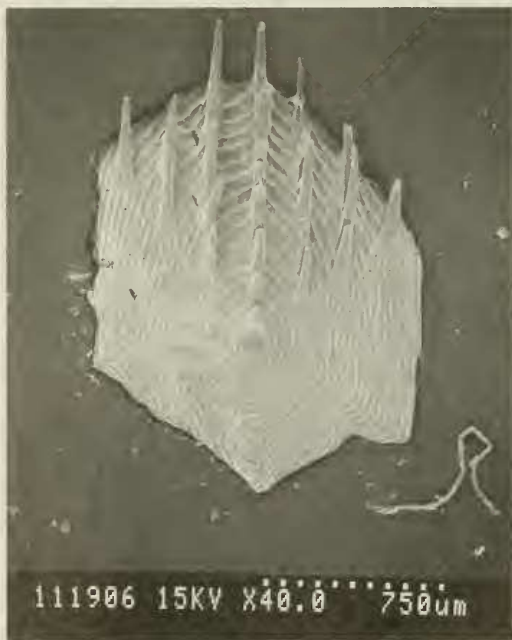


FIGURE 9. Scanning electron micrograph of scale of *Kumba* sp. A, CAS 50152, from dorsum below origin of second dorsal fin. Dotted line equals 0.75 mm.

between lateral nasal ridges about equal to interorbital width. Suborbital region about 0.6 into orbit. Upper jaws extend posteriorly to below midorbit. Chin barbel small but distinct, tapered to a fine tip, its length about equal to pupil diameter. Preopercle somewhat lobelike posteroventrally, the posterior margin inclined forward. Length of gill filaments about equal to diameter of posterior nostril. Gill rakers tubercular. Gill membranes rather narrowly united over isthmus, but lacking a free posterior fold. Opercular opening extends forward to below vertical arm of preopercular ridge.

Premaxillary teeth in a broadly tapered band, 6 or more rows wide; outer teeth enlarged and spaced. Mandibular teeth also in a broad, tapered band, but no enlarged series. All teeth short and rather bluntly tipped.

Snout naked dorsally to area slightly behind a line connecting lateral angles. Broad suborbital shelf completely scaled from lateral angles of snout to preopercle. Underside of snout and suborbital naked to above angle of lower jaw, the naked areas extend onto lower margin of preopercle and interopercle and all of lower jaw. Posterior tip of interopercle probably with few small scales, but none currently on specimen. Head scales as described for *Kumba calvifrons* except spinule rows fewer on occipital (5–8 rows) and suborbital (1–2 rows) scales—probably attributes of small size of specimen compared with adult holotype of *K. calvifrons*. Most scales of body missing, although some patches remaining over dorsum, along lateral line, over nape, and on chest anterior to pelvic fins. A series of spinuleless scales on shoulder girdle below opercular margin. Scales of dorsum (Fig. 9) with 5–7 parallel rows of greatly reclined, short, slender, conical spinules. Scales over nape with spinules tightly aligned in 3–5 vertical, comblike rows, similar to those of top of head.

Pyloric caeca thick, short; more than 50 distal elements. Light organ relatively small; light gland immediately anterior to anus; a well-developed lens. A faintly visible anterior dermal window forward of periproct area, between pelvic fin insertions.

Fin positions best seen in Figure 8. Pelvic fin origin below posterior margin of gill cover, anterior to pectoral and first dorsal fin origins; anal fin origin below anterior 1/3 of base of first dorsal. Interspace between first and second dorsals slightly longer than length base of first dorsal.

Second dorsal weakly developed throughout. Length of first dorsal about equal to postrostral length of head; spinous second ray with numerous short, conical spinules. Outer pelvic ray produced into a long, thin filament that extends posteriorly to base of 16th anal ray.

Color somewhat faded, overall light to medium brown; gill membranes, abdomen, and chest blackish. First dorsal fin basally dark, paler distally; pectoral fin pale; pelvic fin dark; anal fin dark anteriorly but otherwise mostly pale. Gill cavity mostly pale over inner walls, but darker along distal margins. Barbel pale.

**DISTRIBUTION.**—Known only from the single specimen taken in the western Indian Ocean off Mozambique in 850–960 m.

**REMARKS.**—This specimen was originally recorded by Iwamoto (1986) as *Nezumia hebetata*, but slight differences in several measurements and counts (see Table 1) suggest that it represents a different but closely related species. The specimen is slightly larger than the holotype and only known specimen of *Kumba hebetata*, and this size difference may account for some of the morphometric differences. The high dorsal-ray (II, 13) and pectoral-ray (i23–i24) counts of the *K. hebetata* holotype contrast sharply with the II, 9 and i20 found in the Mozambique specimen. Otherwise, the two specimens agree well in other general features. The Mozambique specimen actually agrees closer in most morphometric and meristic characters with *Kumba* sp. A than with *K. hebetata*. The primary contrasting characters with *Kumba* sp. A are the fewer dorsal fin rays, the slightly fewer gill rakers, the fewer pyloric caeca, and the less extensive dorsal naked areas on the snout (extends only to lateral nasal angles vs. posterior to angles in sp. A).

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#### RUSSIAN ABSTRACT

АННОТАЦИЯ: Ревизован род *Kumba* Marshall, 1973; в него включены девять видов: *K. calvifrons* sp.n. со срединно-Атлантического подводного хребта; *K. dentoni* Marshall, 1973; *K. gymnorhynchus* sp.n. из восточной части Индийского океана; *K. hebetata* (Gilbert, 1905); *K. japonica* (Matsubara, 1943); *K. maculisquama* (Trunov, 1981); *K. punctulata* sp.n. из морей Бисмарка и Кораллового, а также 2 других вида, не получивших названия. Приводятся описания двух последних видов, но они оставлены без названий, так как представлены незрелыми особями или имеют сомнительный статус. Род *Parakumba* Trunov, 1981 сведен в синонимы *Kumba*. Комбинация диагностических признаков рода такова: имеются обширные бесчешуйные участки на верхней и нижней сторонах рыла и нижней поверхности головы; отсутствуют увеличенные рыльные чешуи; чешуи на голове своеобразного строения: с одним или немногими гребенковидными рядами небольших прямостоящих шипиков, мелкие; в подглазничной области отсутствуют увеличенные щитковидные чешуи.

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